INDIAN EARTHWORMS.

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IV. THE GENUS *LAMPITO* KINBERG.

CONTENTS.

INTRODUCTION.

The present contribution and those to follow in this series are outgrowths of a study, begun several years ago, on the classification of the Megascolecidae and in particular of the Megascolecinae. To avoid repetition of past mistakes, such a project has to be based on a careful investigation of worms themselves rather than on literature. Yet repeated attempts to secure the necessary material have been fruitless or nearly so, and without the co-operation of Dr. B. Prashad the effort would have been abandoned. Although all material in the Indian Museum has been available for examination, this is quite insufficient for the purposes in view and accordingly results hitherto obtained can only be presented somewhat tentatively and with a very definite proviso as to the necessity for confirmation when more and better material is available.

In the genus with which we are now concerned there are seven species. One of these is markedly peregrine. Aside from that form, all other (and of course the more interesting) species are known only from the type localities, while three, *kempi, palniensis* and *sylvicola,* are known only from single specimens. Of the types of a fourth species, *marianae,* all but one are juvenile. The types of *kempi, palniensis* and *sylvicola* are probably postsexual aclitellates, that of *kempi* in poor condition. Although Michaelsen had 36 specimens of *vilpattiensis,* only two clitellate individuals of this species are in the Indian Museum. Important structures, removed from the types of *marianae, palniensis* and *sylvicola* in

previous dissections, have been lost. In view of the status of the specimens examined, as types in the national collection, further drastic dissection is inadvisable, even though such dissection would enable definite statements with regard to important characteristics such as the location of the spermathecal pores.

As before, Dr. B. Prashad, Director of the Zoological Survey of India, has unreservedly made available the resources of the Indian Museum for which the author's heartiest thanks are again extended. Thanks are also due to Mr. L. W Trueblood for assistance with matters geographical, and in addition to Prof. K. S. P. Aiyer for the gift of specimens from his own collections, and to Dr. F. H. Gravely for information regarding the location and elevation of Vilpatti.

Genus **Lampito** Kinberg.

1867. *Lampito*, Kinberg, *Öfv. Ak. Förh.* XXIII, p. 103. (Genotype, *L. mauritii* Kinberg 1867.)
1869. *Megascolex* (part), Vaillant, *Hist. nat. Annel.* III, (2), p. 62.
1895. *Megascolex* (part), Beddard, *Monog.*, p. 370.
1900. *Megascolex* (part), Michaelsen, *Das Tierreich*, X, p. 212.
1907. *Megascolex* (part), *Fauna S. W. Austral.* I, p. 163.
1907. *Lampito*, Michaelsen, *Mitt. Mus. Hamburg* XXIV, p. 159.
1909. *Lampito*, Michaelsen, *Mem. Ind. Mus.* I, p. 178.
1916. *Megascolex* (part), Michaelsen, *K. Svensk. Vet. Handl.* LII, (13), p. 57.
1923. *Megascolex* (part), Stephenson, *Oligochaeta* in *F. B. I.*, p. 222.
1928. *Megascolex* (*Lampito*), Narayan Rao, *Half Yearly Mysore Univ. J.* II, (1), p. 6.
1930. *Megascolex* (part), Stephenson, *The Oligochaeta*, p. 837.

Diagnosis.—Male pores on xviii. Female pores paired on xiv. Clitellum annular. All septa from 4/5 or 5/6 present. Gizzard in v. Calciferous tissue in longitudinally placed, more or less lamelliform ridges on the inner wall of the oesophagus in x-xiii. Intestine begins in xv-xvi, typhlosole present. Hearts four pairs, in x-xiii, latero-oesophageal. Excretory organs: paired rosettes or vertically flattened clusters of micronephridia on the anterior faces of the septa in v-xiii (or xiv), integumentary, closed exonephric micronephridia from xv posteriorly, in broad bands (in xv-xvii) or single rows just behind the septa ; 1 pair of open, enteronephric meganephridia with preseptal funnels, from xx-xxi posteriorly. Prostates racemose, strap-shaped or compact. Spermathecae with small, paired, median and lateral diverticula.

Remarks.—Reproductive apertures are ventral and superficial in all species, and except for the spermathecal and male pores of *mauritii*, also minute.

Lampito is distinguished from all other Indian Megascolecinae, except *Nellogaster* (and possibly *Tonoscolex*), by the presence of paired enteronephric meganephridia with preseptal funnels along with closed integumentary and pharyngeal micronephridia, and from *Nellogaster* by the absence of integumentary micronephridia in the first thirteen segments, the presence of paired spermathecal diverticula, and the location of the gizzard in v.

Lampito was separated off from *Megascolex* by Michaelsen in 1909 after finding two South Indian species with a combination of mega-

and micronephridia like that of *mauritii.* In 1916 *Lampito* was suppressed as Michaelsen had come to believe that a combination of the two types of nephridia arose sporadically in widely diverse groups and hence was of no importance. With this Stephenson agreed (1923, p. 223) mentioning as further evidence the many varieties of nephridial arrangement in the genus *Megascolex* (and in particular *M. escherichi* Michaelsen 1910 which is purely micronephridial while *M. e.* var. *papillifer* Stephenson 1915 has the *Lampito* arrangement) and the lack of common origin of the " *Lampito* " species.

Lampito dubius Stephenson 1916 from Kurseong in the East Himalayas is a *Perionyx* and the holotype is possibly only an aclitellate specimen of *P. m'intoshii. (vide* Gates 1934). *Lampito trilobata* Stephenson 1914 from Baroda and Bombay, is a synonymn of *mauritii.* The " lack of common origin " objection is no longer true.

Michaelsen's argument as to the sporadic occurrence of the mega- and micronephridial combination scarcely seems valid. The " sporadic occurrence " of racemose prostates or perichaetine setae has not been considered an objection to the use of those characteristcs in generic definition, in fact quite the contrary. *M. escherichi* and its variety *papillifer* are of no importance in this connection as the nature of the supposed " meganephridia " of variety *papillifer* is unknown,—the larger tubules, having no connection with the septa, may only be enlarged micronephridia. Even if the " meganephridia " of papillifer are enteronephric as in *Lampito*, other evidence of similarity to the *Lampito* species is lacking.

Michaelsen refrained from using the paired condition of the spermathecal diverticula as a generic characterisation in 1909 " as the finding of a single spermathecal diverticulum can only be regarded as of specific value " It scarcely seems necessary to worry about what the future may reveal as to the spermathecal diverticula. All that is of importance for the present is the material now available for study. All such material is without exception characterised by paired diverticula, on all spermathecae, of all specimens, in each species. A characteristic that is uniform in a group of species otherwise entitled to separate generic ranking is regarded as of generic and diagnostic value.

Furthermore paired spermathecal diverticula are very rare in other Indian Megascolecinae and especially those which are closely related to *Lampito.* Aside from *Perionyx*[1] which certainly need not be taken into consideration in any discussion of *Lampito* relationships, only two Indian species, *Plutellus palniensis* Michaelsen 1907 and *Megascolex curgensis* Michaelsen 1921, have paired diverticula.

In the first species the spermathecae are unpaired and median, the paired condition of the diverticula accordingly capable of interpretation as the result of incomplete fusion of a pair of spermathecae. In the

[1] Four species of *Perionyx, fossus* Stephenson 1920, *himalayanus* Michaelsen 1907, *minimus* Stephenson 1920, and *shillongensis* Stephenson 1920, have paired diverticula on the spermathecae but diverticula are often quite variable intraspecifically in *Perionyx* and may be rather indefinite,

other species the supposedly paired diverticula open into the duct through a common basal region so that the paired condition can be regarded as the result of an incomplete bifurcation of a single diverticulum. The ramshorn-shaped bifurcations are further quite different from the *Lampito* diverticula.[1]

Phylogenetic seriation of the known species of *Lampito* is impossible. An ancestral form, in addition to the generic characteristics probably had lumbricine setae with *a* and *b* of xviii modified to penial setae, and two pairs of spermathecae opening to the exterior on 7/8-8/9. *L. mauritii* which retained the penial setae is derived from the ancestral form by a marked increase in the number of setae and the development of a third pair of spermathecae belonging to vii. Later a common ancestor of the remaining species lost its penial setae while the spermathecal pores were slightly dislocated onto the anterior margins of viii and ix. From such a form *palniensis* is derived by special development of the calciferous lamellae and the appearance of lymph glands. The next stage was the development of perichaetine setae but less extensively than in *mauritii* and the loss of the anterior pair of testes and male funnels. *L. vilpattiensis* with spermathecal pores fairly close to 7/8 and 8/9 may represent an offshoot at this stage. In the remaining species the chief development is merely a continuation of the posterior dislocating of the spermathecal pores. In *marianae* both pairs of pores have reached a position in *ab* just in front of the transverse setal lines. In *kumiliensis* the pores are shifted just median to *a* and into the transverse setal lines, in *sylvicola* the shift still further behind to a point about halfway between the transverse setal lines and the posterior intersegmental furrows. *L. kempi* retained a *marianae* location for the posterior pores but along with a shift of the anterior pores into a *sylvicola* position.

Distribution.—South India, northern half of the Cardamom Hills and the Palni Hills (endemic species only). One species is widely peregrine but its original home must have been in the lowlands round about the region where its nearest relatives are endemic.

The non-peregrine species are only known from two localities about 75 miles apart, *kumiliensis* from Kumily near Lake Periyar in the northern half of the Cardamom Hills and the others from the vicinity of Kodaikanal in the Palni Hills.

The endemic species are restricted to the hills: *kempi* found at an elevation of 4,200 feet, *kumiliensis* at 1,500 feet, *marianae* at 7,000 feet, *palniensis* at 7,000 feet, *sylvicola* at 5,500 feet, *vilpattiensis* at 6,000 feet. The other species, *L. mauritii* is a lowland form, found but rarely above the 500 foot level, and then only up to 2,500 feet.

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[1] Of Ceylonese Megascolecinae only three species are said to have paired diverticula. In one of these, *Notoscolex ceylanensis* (Michaelsen) 1897, one of the diverticula is said to be rudimentary or lacking, or at best smaller than the normal diverticulum. In another species, *Notoscolex crassicystis* (Michaelsen) 1897, "In manchen Fallen war nur ein einzige Divertikel vorhanden". The third species, *Megascolex leucocyclus* (Schmarda) 1861, has paired diverticula but here again the spermathecae are unpaired and median so that the paired condition is presumably the result of incomplete fusion of a pair of spermathecae. The diverticulum also has multiple seminal chambers rather than a single chamber as in *Lampito*.

Key to species of Lampito.

1.	*a.* Quadrithecal	2
	b. Sexthecal	*mauritii.*
2.	*a.* Holandric, setae lumbricine throughout ..	*palniensis.*
	b. Metandric, setae perichaetine posteriorly ..	3
3.	*a.* Male pores on an unpaired genital shield ..	*marianae.*
	b. Male pores not on an unpaired genital shield, on small paired porophores	4
4.	*a.* Anterior spermathecal pores postsetal, posterior spermathecal pores presetal	*kempi.*
	b. Both pairs of spermathecal pores similarly located with relation to the setae	5
5.	*a.* Genital markings paired, on xviii	*vilpattiensis.*
	b. Genital markings unpaired and not on xviii ..	6
6.	*a.* Spermathecal pores on transverse setal line and just median to *a*, genital markings on xvii ..	*kumiliensis.*
	b. Spermathecal pores postsetal, genital markings on xix	*sylvicola.*

As in previous papers, negative statements are omitted from specific diagnoses. If a species lacks genital markings no mention of such markings is made. If however nothing is known of certain characteristics of specific importance attention is drawn to this gap in our knowledge by inclusion of the name of the particular structure followed by an interrogation mark. Location of the first pair of meganephridia as well as characteristics of the spermathecae and prostates may prove, on further study, to be of diagnostic value.

Lampito kempi, sp. nov.

Material examined.—From the Indian Museum: 1 sexual (?), dissected specimen labelled, "*Megascolex sylvicola* (Mich.) var. nov. ? Under stone in dense jungle, Palni Hills, near Neutral Saddle, 4,200 ft. 14 Sept. 1922. S. Kemp. W 1158/1".

External characteristics.—The minute and superficial spermathecal pores have not been seen but the anterior pores are probably on viii, about half way between the transverse setal line and 8/9, the posterior pores on ix slightly in front of or close to the transverse setal line, the pores on or close to *a*. The spermathecae are in viii and ix, the anterior pair passing into the parietes slightly in front of the parietal attachment of 8/9, the posterior pair passing into the parietes behind 8/9 and close to the setae of ix.

The male pores are minute and superficial, each pore probably at or near the centre of a small, transversely placed area of elliptical outline, possibly located on an anterior portion of xviii. Ventral setae of xviii apparently lacking.

Genital markings, if present, are unrecognizable.

Internal anatomy.—Septum 5/6 is membranous, 6/7-10/11 muscular or thickly muscular.

The gizzard is in v.

A large tuft of nephridial tubules is attached to the oesophagus on each side, in front of the gizzard. Integumentary micronephridia are first visible in xv, meganephridia present from xx posteriorly.

Metandric, one pair of male funnels in xi, one pair of seminal vesicles (?) in xii. The prostates which extend through three segments, are flattened, broad in a lateromesial direction, the median portion thick and with smooth margin, the lateral margin thin and with two incisions marking off three lobes. The ducts are 1-1½ mm. long, slender, with slight muscular sheen, emerging from a cleft in the median margin of the anterior lobe.

The spermathecal duct appears to be much shorter than the ampulla, the diverticula joining the entalmost portion of the duct just below the ampulla which is only slightly wider than the duct.

Remarks.—The type is in poor condition as a result of maceration or improper preservation. A slight iridescence of the spermathecal diverticula indicates that the worm may have been sexual but a clitellum is unrecognizable.

The prostates look somewhat like the strap-shaped glands of certain species of *Tonoscolex* but are shorter, broader and more deeply incised laterally.

The label in the tube appears to be in Stephenson's writing but no reference to this specimen has been found in the 1924 paper in which other worms from the same locality are considered.

L. kempi is distinguished from all other species of the genus by the location of the spermathecal pores.

Diagnosis.—Quadrithecal, spermathecal pores on or close to *a*, postsetal on viii and about half way between the transverse setal line and 8/9, posterior pores presetal on ix and close to the transverse setal line. Male pores at or near centres of small, transversely placed porophores of elliptical outline. Genital markings ? Female pores ? Clitellum ? First dorsal pore ? Setae perichaetine ; numbers ? Pigmentation ? Length ? Diameter ?

Intestine begins ? Typhlosole ? Metandric ; seminal vesicles in xii.

Distribution.—Known only from the type locality, Neutral Saddle, Palni Hills, South India.

Lampito kumiliensis (Aiyer).

1929. *Megascolex kumiliensis*, Aiyer, *Rec. Ind. Mus.* XXXI, p. 70. (Type locality Kumily, Travancore. Types in the Indian Museum.)

Material examined.—From the Indian Museum : 2 clitellate, undissected specimens labelled, " *Megascolex kumiliensis* Aiyer. Kumily. K. S. P. Aiyer. Types. W 1522/1."

From Prof. K. S. P. Aiyer : 4 clitellate, undissected specimens labelled, " *Megascolex kumiliensis sp. nov.* 26/12/26. K. S. P. Aiyer".

External characteristics.—The setae begin on ii. The setal numbers are shown below. As might be suspected from these numbers the setae are usually paired though any particular seta may be lacking or displaced while extra setae may be present between the pairs. In the posterior

portion of the body the mid-dorsal interval, wide anteriorly, is gradually reduced though without increase in number of setae (8-9 pairs posteriorly).

ii	iii	iv	vii	xii	xxi
9	10	11	11	12	14*
8	13	12	12	12	16*
4	6	11	12	12	15
8	9	10	12	12	16
6	7	10	12	12	16
5	3	9	12	12	16

* Setal pits in which no setae are visible have been counted as setae on these worms.

The first dorsal pore is on 10/11 (4), on 11/12 but with a pore-like and possibly perforate marking on 10/11 (2).

The clitellum extends from a posterior portion of xiii onto the anterior margin of xix, conspicuously protuberant except at the anterior and posterior extremities where it is not sharply demarcated ; dorsal pores (except on 13/14 and 18/19) lacking, intersegmental furrows lacking or only slightly indicated ventrally, setae present except the ventral pairs of xviii.

The spermathecal pores are minute and superficial, on the transverse setal lines of viii and ix, just median to *a* (6), nearer to *a* than the latter is to *b*.

The female pores are paired, anterior and slightly median to *a* (6).

The male pores are minute, diagonally placed slits, each pore on a small, raised, transversely placed porophore of shortly elliptical outline that extends from slightly lateral to *b* or just at *b* nearly to the mid-ventral line, the pore on or median to *b* and hence on the lateral portion of the porophore (6).

The genital markings are conspicuously raised, on the presetal portions of xvii and xx (6), occasionally bulging 16/17 (slight trace only) and 19/20 anteriorly, each marking with a small, slightly depressed, grayish translucent central portion.

Internal anatomy.—The gizzard is in v (6). The oesophagus in ix-xiii is moniliform, septally constricted, heavily vascularized, the inner wall provided with low but slightly lamelliform ridges which are sharply zigzagged and interrupted or almost so septally. At first glance the appearance is as of numerous V-shaped ridges which are lacking across the mid-dorsal and mid-ventral lines. The intestine begins in xvi (6), but the oesophageal valve is clearly recognizable (in the posterior portion of xv and the anterior part of xvi) only in one specimen, possibly slightly relaxed in the other worms. The typhlosole begins in xxvii (3) and is a low, simple ridge, slightly irregular, decreasing in height passing posteriorly but broadened slightly towards the hind end, unrecognizable behind cvii (1) or cviii (1 worm with 134 segments).

The dorsal blood vessel (single) is continued onto the pharyngeal bulb to the region of the supra-oesophageal ganglia. The ventral trunk has not been traced anterior to ix. The supra-oesophageal trunk is present in ix-xiii terminating posteriorly by dividing into two branches which pass laterally and then ventrally on the coelomic face of the gut nearly to the ventral side. Extra-oesophageal trunks are first visible

close to the circumoesophageal nervous commissures from where they pass ventrally and then posteriorly, parallel to the nerve cord. Only one trunk was found in this region in each specimen and this receives just behind the suboesophageal ganglia 3 commissures from a vessel close to the nerve cord which appears to be an anterior continuation of the ventral trunk, (this latter bifurcating anteriorly at the front margin of the suboesophageal ganglia). The extra-oesophageal passes dorsally between the hind end of the pharyngeal bulb and the large nephridial cluster of iv, and then turns to run posteriorly at a level just beneath the gizzard, both trunks recognizable from the nephridial clusters posteriorly and with a transverse connective immediately behind the clusters. Posterior to this connective each trunk receives a fairly large vessel from the lateral face of the pharyngeal bulb. In vi-viii the trunks pass onto the ventral face of the gut close to the midventral line where they can be traced posteriorly into xiii. No subneural. The hearts of x-xiii bifurcate dorsally, the anterior bifurcation large and filled with blood, the posterior slender and white. The anterior branches of the hearts of xiii pass into the bifurcations of the supra-oesophageal quite some distance lateral to the supra-oesophageal trunk while the anterior branches of hearts of ix and xii pass into transvere vessels that open into the supra-oesophageal. In x and xi the anterior branches of the hearts appear to pass directly into the supra-oesophageal. A fairly large, longitudinally placed parietal vessel is visible on each side in xiv-xviii. Just anterior to 13/14 this vessel turns dorsally to open into the posterior bifurcation of the supra-oesophageal just lateral to the junction with anterior branch of the heart, no connective to the extra-oesophageal found. The last pair of hearts is in xiii (6). Paired commissures from the dorsal blood vessel are present in ix-vi. No commissures have been found in v but at the anterior end of the gizzard two large branches from the dorsal trunk pass ventrally into the cluster of nephridial tubules of iv. Commissures and hearts of ix-xiii pass into the ventral trunk.

The nephridia are as in *mauritii* except as follows : each transverse integumentary micronephridial band of xv-xvii is separated into three to five fairly large clusters or rosettes of nephridial tubules which only rarely are so closely crowded as to produce a somewhat band-like appearance ; the long and slender meganephridia reach nearly to the mid-dorsal line. The funnels of the meganephridia have not been seen but the ducts are well preserved and can be traced dorsally nearly to the region of the dorsal blood vessel.

The rather strap-shaped prostates are fully developed only in one specimen where they reach posteriorly to 24/25, the lateral margins incised and thin, the median margins thick and smooth. In other worms the prostates appear to be juvenile or rudimentary, restricted to xviii or xviii-xix or xvii-xviii, the incisions of the lateral margin, in part at least, independent of the septa. Associated with the posterior end of a prostate there may be a compact, rather brittle body distinguished from the whitish gland proper by brown colouration, greater thickness and non-lobed condition. This outgrowth (?) may be smaller or larger than the gland, and when present is to be found only on one prostate,

(on the right side, 3 specimens). The vas deferens has not been traced throughout but is recognizable in xviii where it is rather thick, adherent to the parietes, passing into the prostate gland and not into the duct. There is no spermatozoal iridescence on any of the male funnels (four specimens from Prof. Aiyer).

The spermathecal duct and ampulla are not marked off externally. Ental to the diverticular junction the lumen is large and transversely elliptical in section and into this chamber the diverticula open, the diverticular lumen turning entally at the diverticular junction. Ectal to the junction the lumen of the duct is narrow and the wall thick, the duct gradually narrowing ectally, very slender within the parietes. The diverticula are not marked off externally into seminal chamber and stalk but a stalk portion may be recognized in cleared spermathecae by the thicker wall and narrow lumen. There is no spermatozoal iridescence (5 specimens).

The longitudinal musculature is uninterrupted over sites of the genital markings. In sections the male porophores and genital markings are obviously areas of epidermal thickening, the thickening greatest on the genital mrkings.

Remarks.—One of the Indian Museum worms appears to be sexual; all others, lacking spermatozoal iridescence on male funnels and in spermathecal diverticula, are presumably not sexual. The juvenile or rudimentary condition of the prostates, in view of the complete or nearly complete clitellar development, may be evidence for some abnormal interference with development.

Calciferous lamellae appear to be less well developed in *kumiliensis* than in other species.

Diagnosis.—Quadrithecal, spermathecal pores just median to *a* and on the transverse setal lines of viii and ix. Male pores on or median to *b*, each pore on the lateral portion of a small, transvesely placed porophore of elliptical outline, extending from the region of *b* nearly to midventral line. Genital markings unpaired, presetal, in *bb*, on xvii and xx. Clitellum from posterior portion of xiii to anterior portion of xix. First dorsal pore on 10/11. Setae perichaetine: 8-9/ii, 10-13/iii, 10-12/iv, 11-12/vii, 12/viii, 14-16/xxi. Pigmentation ? Length 100-120 mm. Diameter 3 mm.

Intestine begins in xvi. Typhlosole, a very low, simple, slightly irregular ridge; beginning in xxvii and terminating in cvii-cviii. Metandric; seminal vesicles in xii.

Distribution.—Known only from the type locality Kumily, Travancore.

Lampito marianae (Stephenson).

1924. *Megascolex sylvicola* var. *marianae* Stephenson, *Rec. Ind. Mus.* XXVI, p. 336. (Type locality Marian Shola, Palni Hills, S. I. Types in the Indian Museum.)

Material examined.—From the Indian Museum: 1 clitellate and 3 juvenile specimens labelled, "*Megascolex sylvicola* (Mich.) var. *marianae*, nov. Under wood in jungle, Marian Shola, *ca.* 7,000 ft. Palni Hills, S. I. S. Kemp. 24 Aug. 1922. Types. W 1121/1".

External characteristics.—Unpigmented (? alcoholic preservation). The prostomium is retracted into the buccal cavity, prolobous.

Determination of setal numbers is difficult as a result of the presence in the setal circles of gaps and markings that look somewhat like the setae, as well as eroded areas in the epidermis, the numbers noted herewith possibly not quite correct; 8/ii, 13/iii, 19/iv, 16+/viii, 20+/xii, 26/xx, 26/xxx. On the posterior preclitellar and the anterior postclitellar segments *ab* and *cd* are paired, but posteriorly this condition disappears.

The clitellum is clearly marked, on xiv to the setal circle of xviii, annular.

The spermathecal pores are unrecognizable possibly as a result of damage to the epidermis but are located on viii and ix, in *ab*, and either on the transverse setal line or just in front of the line (confirmed by dissecting the spermathecal ducts out of the parietes).

The female pores were not found (possibly unpaired).

The genital shield is crescentic, transversely placed with the concave side anteriorly, reaching laterally into *ef*, sharply demarcated on each side by a slight but definite groove which passes into 17/18 at *e* and 18/19 at *c*. An anterior portion of the shield is protuberant and on this raised portion there is a very slight, somewhat irregular but rather crescentic groove, concave anteriorly, reaching laterally on each side at least to *c*. Behind the elevation and only a slight distance from 18/19 mesially there is a more definite though slight groove which runs anterolaterally nearly to the margin of the shield. On this latter groove, in *ab*, there is a tiny, whitish, somewhat conical protuberance on which the male pore is probably located. The ventral setae of xviii appear to be lacking.

Internal anatomy.—The inner wall of the oesophagus in xi-xiii is provided with lamelliform longitudinal ridges. An oesophageal valve is in the anterior part of xvi and possibly also the posterior part of xv, the intestine accordingly beginning in xvi (2). The typhlosole begins gradually in xxiii-xxiv, and while small is definitely larger than in other species. Anteriorly the typhlosole in section has an inverted T-shape, the smaller horizontal lamella forming the ventral margin of the typhlosole with a dark red appearance as if gorged with blood. Passing posteriorly the horizontal lamella is gradually reduced and finally lost but the ventral margin of the typhlosole still continues to be dark red.

The hearts of xii and xiii are latero-oesophageal (2). Paired mid-segmental, vertical vessels to the supra-oesophageal trunk are present as in *mauritii*. Parietal vessels are visible in xvii-xiii, in the latter segment rising from the body wall to pass to the gut. No subneural vessel.

There is a large cluster of nephridial tubules on each side of the gut just in front of the gizzard, and attached or connected to the oesophagus by a stalk or band containing muscle fibres. Additional paired, vertically flattened clusters of nephridial tubules are present in each of vi-x, possibly xi (none found in xii), and xiii, the clusters on the anterior faces of the septa near the gut. In xiv, on each side, there is a small, rosette-like cluster of tubules, on the ventral parietes, or base of 14/15. The integumentary micronephridia of xv, xvi and xvii are in wide, transverse bands as in *mauritii*, from xviii posteriorly in vertical rows close to the bases of the septa (posterior faces).

The prostates are slightly longer than wide, compact, lobed though not so much as in *mauritii*.

The prostatic duct is 2-3 mm. long, slender but with muscular sheen.

In xiv, high up on the posterior face of 13/14 there is a pair of small structures that may be ovisacs.

Remarks.—The intestine of xvii-xviii of the type had been removed. A specimen on which the male shield seemed to be most developed was dissected for further information regarding the typhlosole. In this worm the prostates are confined to xviii and the spermathecae are obviously juvenile.

Diagnosis.—Quadrithecal, spermathecal pores in *ab*, on or just anterior to the transverse setal lines of viii and ix. Male pores in *ab*, on tiny conical protuberances from a transversely placed genital shield of crescentic outline with concave side anteriorly, reaching laterally into *ef*. Female pores ? Clitellum from 13/14 to setae of xviii. First dorsal pore on 9/10. Setae perichaetine: 8/ii, 13/iii, 19/iv, 16+/viii, 20+/xii, 26/xx. Unpigmented ? Length 110 mm. Diameter $2\frac{1}{2}$ mm.

Intestine begins in xvi. Typhlosole with a ventral, transversely placed lamella anteriorly so that the section is of an inverted T-shape; beginning in xxiii-xxiv and terminating in (?). Metandric; seminal vesicles in xii.

Distribution.—Known only from the type locality, Marian Shola, Palni Hills, South India.

Lampito mauritii Kinberg.

1867. *Lampito mauritii*, Kinberg, *Öfv. Ak. Förh.* XXIII, p. 103. (Type locality Mauritius. Type in the Stockholm Museum.)
1883. *Perichaeta armata*, Beddard, *Ann. Mag. Nat. Hist.* (5) XII, p. 216. (Type locality Calcutta. Types ?)
1887. *Perichaeta bivaginata* + *P. salettensis*, Bourne, *Proc. Zool. Soc. London*, 1886, pp. 666 and 669. (Type locality of both species Salem, 1,000 feet, South India. No types.)
1888. *Megascolex armatus*, Rosa, *Ann. Mus. Genova* XXVI, p. 159, and *Boll. Mus. Torino*, III, (50), p. 2.
1889. *Megascolex armatus*, Rosa, *Ann. Mus. Genova* XXVII, pp. 125 and 134, and *Boll. Mus. Torino* IV, (73), p. 2.
1889. *Megascolex armatus* + *M. Mauritii* Vaillant, *Hist. Nat. Annel.* III, (1), p. 70.
1891. *Perichaeta armata*, Bourne, *Quart. J. Mic. Sci.* XXXII, pp. 50 and 55.
1891. *Perichaeta madagascariensis*, Michaelsen, *Arch. Natg.* LVII, (1), p. 227. (Type locality N. W. Madagascar. Type in the Berlin Museum.)
1891. *Perichaeta Mauritii*, Michaelsen, *Jahrb. Hamburg. Wiss. Anst.* IX, p. 58.
1891. *Megascolex armatus*, Rosa, *Ann. Nat. Hofmus. Wien* VI, p. 404.
1893. *Megascolex armatus*, Horst, in Weber, *Reise Niederl. Ost-Ind.* III, pp. 29 and 71.
1895. *Perichaeta madagascariensis*, Michaelsen, in *Deutsch-Ost-Afrika* IV, Regenwurmer, p. 40.
1895. *Lampito mauritii*+*Megascolex armatus*+*M. madagascariensis*, Beddard, *Monog.* pp. 369, 384, 385.
1897. *Megascolex armatus*, Michaelsen, *Mitt. Mus. Hamburg* XIV, pp. 5 and 208,
1897. *Megascolex armatus*+*M.* (?) *mauritii*, Michaelsen, *Abh. Senck. Ges.* XXXI, pp. 224 and 225.
1898. *Megascolex armatus*, Michaelsen, *Zool. Jahrb. Syst.* XII, p. 144.
1898. *Megascolex armatus*, Rosa, *Ann. Mag. Nat. Hist.* (7) II, p. 290.
1899. *Megascolex armatus*, Michaelsen, *Mitt. Mus. Hamburg* XVI, p. 10.
1899. *Megascolex mauritii*, Michaelsen, *Öfv. Ak. Förh.* LVI, p. 441.

1900. *Megascolex mauritii* (part), Michaelsen, *Das Tierreich* X, p. 227. (Excluding *Perichaeta coerulea* and *P. luzonica* Perrier 1875, *Megascolex perrieri* Vaillant 1889, and *Perichaeta mauritiana* Beddard 1892.)
1902. *Megascolex mauritii*, Michaelsen, *Die Geogr. Verbr.* p. 93.
1903. *Megascolex mauritii*, Beddard, *Fauna Laccad. Archipel.* p. 375.
1905. *Megascolex mauritii*, Michaelsen, *Zeit. Wiss. Zool.* LXXXII, p. 290.
1907. *Megascolex mauritii*, Michaelsen, in Voeltzkow, *Reise Ostafrika 1903-05*, II, p. 44.
1909. *Megascolex mauritii*, Cognetti di Martiis, *Boll. Mus. Torino* XXIV (602), p. 2.
1909. *Lampito mauritii*, Michaelsen, *Mem. Ind. Mus.* I., p. 179.
1910. *Lampito mauritii*, Michaelsen, *Abh. Nat. Ver. Hamburg* XIX (5), p. 62.
1911. *Lampito mauritii*, Cognetti di Martiis, *Ann. Mag. Nat. Hist.* (8) VII, pp. 494 and 498.
1913. *Lampito mauritii*, Michaelsen, *Mitt. Mus. Hamburg.* XXX, p. 79.
1913. *Lampito mauritii* var. *zeylanica*, Stephenson, *Spolia Zeylanica* VIII, p. 263. (Type locality Anuradhapura, Ceylon. Type in the Indian Museum.)
1914. *Lampito barodensis* (*lapsus* for *trilobata*)+*L. mauritii*+*L. trilobata*, Stephenson, *Rec. Ind. Mus.* X, pp. 323 and 340. (Type locality of *trilobata* Baroda. Types in the Indian Museum.)
1915. *Lampito mauritii*, Stephenson, *Mem. Ind. Mus.* VI, p. 75.
1916. *Lampito mauritii*, Michaelsen, *Ark. Zool.* X, (9), p. 9.
1916. *Megascolex mauritii*, Michaelsen, *Kungl. Svensk. Vet. Handl.* 52, (13), p. 52.
1916. *Lampito mauritii*, Prashad, *J. Bombay Nat. Hist. Soc.* XXIV, p. 504.
1916. *Lampito mauritii*, Stephenson, *Rec. Ind. Mus.* XII, p. 315.
1917. *Lampito mauritii*, Stephenson, *Rec. Ind. Mus.* XIII, p. 385.
1920. *Lampito mauritii*, Stephenson, *Mem. Ind. Mus.* VII, p. 222.
1921. *Megascolex mauritii*, Stephenson, *Rec. Ind. Mus.* XXII, p. 759.
1922. *Megascolex mauritii*, Stephenson, *Rec. Ind. Mus.* XXIV, p. 432.
1922. *Megascolex mauritii*, Michaelsen, *Cap. Zool.* I, (3), p. 22.
1923. *Megascolex mauritii*+*M. trilobatus*, Stephenson, *Oligochaeta* in *F. B. I.* S., pp. 259 and 279.
1924. *Megascolex mauritii*+*M. trilobatus*, Stephenson, *Rec. Ind. Mus.* XXVI, p. 335.
1924. *Lampito mauritii*+*L. trilobata*, Bahl, *Quart. J. Mic. Sci.* LXVIII, p. 72. (Nephridia).
1925. *Megascolex mauritii*, Gates, *Rec. Ind. Mus.* XXVII, p. 473. (Luminescence).
1925. *Megascolex mauritii*, Stephenson, *Rec. Ind. Mus.* XXVII, p. 56.
1926. *Megascolex mauritii*, Gates, *J. Bombay Nat. Hist. Soc.* pp. 182-185, *J. Burma Res. Soc.* XV, p. 207, *Ann. Mag. Nat. Hist.* (9) XVII, p. 440, and *Rec. Ind. Mus.* XXVIII, p. 151.
1926. *Megascolex mauritii*, Stephenson, *Rec. Ind. Mus.* XXVIII, p. 256.
1928. *Megascolex mauritii*, Michaelsen, *Treubia* X, p. 291; and *Ark. Zool.* XX, (3), p. 10.
1928. *Megascolex* (*Lampito*) *trilobatus*+*M.* (*L.*) *mauritii*. Narayan Rao, *Half-yearly Mysore Univ. J.* II, (1), p. 6.
1929. *Megascolex mauritii*, Aiyer, *Rec. Ind. Mus.* XXXI, p. 63. (Cerebral ganglia and prostomial nerves.)
1929. *Megascolex mauritii*, Gates, *Proc. U. S. Nat. Mus.* LXXV, (10), p. 7.
1929. *Megascolex mauritii*, Michaelsen, *Lingnan Sci. J.* VIII, p. 158.
1930. *Megascolex mauritii*, Gates, *Rec. Ind. Mus.* XXXII, pp. 301 and 355.
1930. *Megascolex mauritii*+*M. trilobatus*, Stephenson, *The Oligochaeta*, pp. 206, 207, 212, 215, 237, 423, 550, 635, 662, 666, and 837.
1930. *Megascolex mauritii*, Stephenson, *J. Fed. Malay States Mus.* XVI, p. 273.
1931. *Megascolex mauritii*, Gates, *Rec. Ind. Mus.* XXXIII, pp. 361 and 435.
1931. *Megascolex mauritii*, Michaelsen, *Peking Nat. Hist. Bull.* V, (3), p. 1.
1932. *Megascolex mauritii*, Gates, *Rec. Ind. Mus.* XXXIV, p. 374; and *Lingnan Sci. J.* XI, p. 509.
1932. *Megascolex mauritii*, Stephenson, *Bull. Raffles Mus. Singapore* VII, p. 42.
1933. *Megascolex mauritii*, Gates, *Rec. Ind. Mus.* XXXV, p. 491.
1933. *Megascolex mauritii*, Stephenson, *Proc. Zool. Soc. London*, 1932, p. 914.
1935. *Megascolex mauritii*, Gates, *Bull. Raffles Mus. Singapore* X, p. 91.
1936. *Megascolex mauritii*, Gates, *Rec. Ind. Mus.* XXXVIII, p. 388.
1937. *Megascolex mauritii*, Hla Kyaw and Gates, *J. R. As. Soc. Bengal, Sci.* II, pp. 166-169. (Populations and castings.)

Notes on the synonymy.—Bourne's *bivaginata* and *salettensis* are known only from very inadequate preliminary descriptions which were never supplemented. Bourne himself later considered that both were to be treated as synonyms of *armatus* (=*mauritii*). The types were not preserved. *L. mauritii* has not been recorded from the type locality of Bourne's species, which is 1,000 feet up the hills. There is no reason to suspect that *bivaginata* is other than *mauritii* and this disposition of Bourne's species may accordingly be accepted. But *salettensis*, according to Bourne, lacks penial setae and has a single female pore. The unpaired female pore occurs as a rare variation in *mauritii* (*vide infra*, also noted on *madagascariensis* by Michaelsen) and accordingly is not of importance. Since apenisetal individuals of *mauritii* have not been found some doubt may be expressed as to *salettensis*. Metandric species of *Lampito* have no penial setae but are all quadrithecal. Should a sexthecal, apenisetal species of *Lampito* be discovered at or near the type locality of *salettensis* the possibility that such a worm may be Bourne's species will have to be considered.

Material examined.—From the Indian Museum :—1 dissected clitellate and 1 undissected juvenile specimen labelled " *Lampito zeylanica.* In rotten wood. Anuradhapura (Low Country) Ceylon. 18.x.11. ZEV 6063/7 ", 2 dissected, 21 undissected clitellate and 2 undissected aclitellate specimens labelled, " *Lampito trilobata* Stephenson. Baroda. Lt.-Col. J. Stephenson. 'Type' W 28/1." 1 clitellate specimen labelled, " On the ground near the cistern of Extension Filter bed No. 7 Pulta Waterworks. Pulta Waterworks Survey." 4 clitellate and 2 aclitellate specimens labelled, " On the banks of the New Filter Bed No. 3. Pulta Waterworks. Pulta Waterworks Survey." 1 clitellate specimen labelled, " Between new Filter Bed 4 and Settling Tank. Pulta Waterworks. Pulta Waterworks Survey ", 11 clitellate specimens (and probably 12 juveniles) labelled, " On ground just outside the cistern of New Filter Bed No. 16. Pulta Waterworks. Pulta Waterworks Survey ". From the Fisheries Reserve Officer, Madras :—27 clitellate specimens labelled " Ennur. 21-2-36 ", and 21 clitellate specimens labelled, " West Hill. Feb. 1934 ". From the Bombay Natural History Society :—6 juveniles labelled, " Andheri, Salsette Isl. Thana dist. 14-8-38 ".

External characteristics.—As an occasional variation the paired female pores may be replaced by a single median pore, (28 out of 429 Burmese specimens).

Internal anatomy.—The gizzard is in v (all dissected specimens). On the inner wall of the oesophagus in vii-xiii except at the mid-dorsal and midventral lines, there are longitudinal, regularly zigzagged, prominent ridges, especially well developed in ix-xii, so much so that the ridge designation scarcely does justice to the lamelliform, shelf-like appearance. The ridges are interrupted or nearly so at the oesophageal constrictions in the region of attachment of the septa, and may also be interrupted or nearly so at the midlongitudinal point in each segment. Each ridge slopes dorsally from the septal region to the midsegmental point and then slopes ventrally to the next region of septal attachment. Small calcareous granules have been observed between the ridges. The oesophageal valve is in the posterior portion of xiv and the anterior part of xv, the intestine accordingly beginning in xv. In several specimens the gut is narrowed in the prostatic region. The typhlosole is a very low, simple, slightly zigzagged ridge, extending

from xv to the region of lxxiii behind which it is unrecognizable, possibly slightly higher posterior to xviii than anteriorly.

The dorsal blood vessel (single) is continued into the pharyngeal region as is the ventral vessel. The latter bifurcates over the sub-pharyngeal ganglian, the branches passing laterally and then dorsally along the circum-pharyngeal nervous commissures. An extra-oesophageal trunk is present under the pharynx on each side, with two connectives from the ventral trunk, rising to the ventral face of the gizzard and passing thence posteriorly along the gut till xiii is reached whence the trunk is no longer recognizable. A parietal vessel is usually present on each side in xviii-xiv ; from the body wall in xiii, passing directly into the extra-oesophageal ; or bifurcating, one branch to the extra-oesophageal, the other to the dorsal face of the gut or into the supra-oesophageal ; or only the dorsal branch visible, connection to the extra-oesophageal unrecognizable. In several specimens parietal vessels are quite unrecognizable. In one worm the two parietal vessels bend mesially to unite for a very short distance in xv under the nerve cord. A large supra-oesophageal is present in segments vii-xiii. In each of these segments there is a fairly conspicuous vessel on each side passing ventrally from the supra-oesophageal to the level of the extra-oesophageal trunk. Ventrally the vessels diminish in size, connections with the extra-oesophageal trunks if present have not been seen in any of the worms. The hearts of x-xiii bifurcate dorsally, the posterior bifurcation which passes from the heart to the dorsal blood vessel always slender and white while the anterior branch which passes to the supra-oesophageal is always distended with blood. Commissures of vi-ix connect the dorsal and ventral trunks. No subneural.

In v on each side of the oesophagus, in the space between the hind end of pharynx and the anterior end of the gizzard, there is a fairly large, rather, mop-like mass of nephridial tubules. A fairly strong cord, presumably the duct, can be traced from the nephridia to the ventral side of the posterior portion of the pharynx. In segments vi-xiii, there is on each side of the oesophagus and on the anterior face of the septum a vertically flattened cluster of nephridial tubules. From each of these clusters a translucent cord (duct ?) passes ventrally to the parietes from whence it can be traced anteriorly to or nearly to the septum. The size of these clusters decreases gradually passing posteriorly, those of xiii quite small. In xiv, on each side, there is a rosette-like cluster which is always ventral, but may be on the parietes over the parietal vessel, on the posterior face of 13/14, or on the anterior face of 14/15. A cord (duct ?) passes from the cluster to the parietes just behind 13/14. The integumentary micronephridia in xv, xvi and xvii are closely crowded to form conspicuous transverse bands on the parietes, each band with a width about half the length of the segment. From xviii posteriorly the bands of integumentary micronephridia are replaced by transverse rows, one row just behind each septum. The enteronephric meganephridia are present from xx posteriorly (20). In one worm the right nephridium of xx is lacking, in another both nephridia of xx are lacking, while in a third the meganephridia of xx and the left side of xxi are missing. In one specimen a nephridium is

present in xix on the left side. According to Bahl (1924) the tufts in v-ix are pharyngeal nephridia, ducts from the tufts opening into a ventral portion of the pharynx. Bahl failed to characterize the nephridia of x-xiv.

The prostatic duct is about 2 mm long, with muscular sheen, narrowed ectally and entally, straight, nearly straight, slightly bowed, slightly sigmoid or markedly sigmoid, usually in part surrounded by lobes of the prostate.

In a juvenile specimen of Stephenson's *zeylanica* two distinct penisetal follicles were noted on the median face of the prostatic duct and a similar condition has since been observed in other specimens. In clitellate worms both follicles though distinct appear to be enclosed in a common sheath from which a muscular band is continued dorsally. In each follicle there are two penial setae, of about the same size. On removing the follicle from the parietes one seta is exposed ectally while the other, presumably a reserve seta is not exposed, the tip some distance from the ectal end of the follicle. The two follicles presumably contain modified *a* and *b* setae. Teeth are so closely crowded that it is difficult to recognize distinct rows or circles, but (counting at the margins) there are 7-12 circles.

Notes on the types. Types of zeylanica.—A small central portion of the male porophore bearing the male aperture is depressed (clitellate specimen) but aside from this unimportant result of some peculiar contraction there is nothing to distinguish the porophores from those of typical forms. The single, median female pore is an occasional variation of no importance. The gizzard is in v. In the juvenile specimen there are rudimentary seminal vesicles in ix. No accessory prostates or glands with stalks can be found in either specimen. Presumably the supposed accessory prostates were nothing more than some unusual lobulation of the real prostate. The spermathecal duct is normal though the muscularity is not obvious. The anterior spermathecae and one of the second pair at first glance appear to have but a single diverticulum each, anterior rather than median or lateral. One such diverticulum examined microscopically is in reality two tubular diverticula without differentiation into stalk and seminal chamber, bound together by connective tissue, each tube with its own opening into the duct, obviously an abnormality. There are no differences from typical worms to justify a distinct form.

Types of trilobata.—On every specimen on which female openings can be definitely identified there is a pair of such apertures, the location slightly variable, the pores nearer to each other than to the setae or nearer to the setae. The pores which are unusually difficult to identify are on a transversely placed whitened area of shortly elliptical outline very clearly demarcated by a slightly more opaque but very narrow rim. I cannot recall ever having seen such regularly elliptical, clearly demarcated areas before. The male porophores do not differ from those of typical forms in any important characteristic.

The intestine begins in xv (4). It is true that the gut in xviii is unusually slender, but this is doubtless the result of the pressure on the intestine of the unusually large prostates. In xviii the inner wall of

the gut is longitudinally ridged, the gut in xv-xviii deeply constricted at the septal attachments, whitish and rather superficially resembling the calciferous portion of the oesophagus. There is however an œsophageal valve in the posterior portion of xiv and the anterior part of xv but no valve posteriorly.

In x-xiv the micronephridia are as described above.

There was a rudimentary seminal vesicle in ix on the right side of one of the dissected specimens but the septal attachment was fragile and the vesicle fell off on being touched. In the other dissected specimen there is a fairly well developed vesicle in ix on the left side. In one hitherto unopened specimen vesicles of ix are lacking while in another there is a vesicle in ix on the right side. The penial setae do not differ significantly from those of typical forms.

As was pointed out several years ago (Gates 1926, pp. 442-444) there are no valid reasons for maintenance of *trilobata* as a distinct form.

Diagnosis.—Sexthecal, spermathecal pores on 6/7-8/9, in region of *eg*, larger than the female pores. Male pores (common apertures of prostatic ducts and penisetal follicles) in *bc* or close to *b*, at or near centres of paired, nearly circular, slightly raised porophores, that extend from *a* into *ce*, and anteroposteriorly to and dislocating 17/18-18/19. Clitellum from 13/14 or a postsetal portion of xiii to 17/18. First dorsal pore on 11/12. Setae perichaetine: vii/10-15, viii/12-16, xvii/4, xviii/0, xix/4, 26-39/iii, 40-51/viii, 38-50/xii, 30-42/xx. Pigmentation slight, brown or grey. Length 95-155 mm. Diameter 3-5 mm.

Intestine begins in xv. Typhlosole a very low, simple, slightly zigzagged ridge; beginning in xv and terminating in lxxiii. Holandric; seminal vesicles in ix and xii. Penial setae with horseshoe-shaped to scoop-shaped tip, ornamented with closely crowded circles (7-12) of triangular teeth.

Remarks.—As was the case with certain species of *Pheretima* (*vide* Gates 1937, p. 177) the wide distribution of *L. mauritii* has been overemphasized to the neglect of certain important aspects of that distribution. "This worm is one of the commonest in India—absolutely the commonest in the present collections; and being so widely distributed it is scarcely necessary for the future to note the precise details of each capture." (Stephenson 1920, p. 222). "Very widely distributed, has been recorded from all parts of India, except apparently the United Provinces." (Stephenson 1923, p. 260). Actually *mauritii* is unknown from Coorg, Baluchistan, the Northwestern Frontier Province, Kashmir, Assam, Nepal, Sikkim, and Bhutan, while there is only one record each from Central Provinces, Orissa, United Provinces, Mysore, and Hyderabad Deccan, two each from the Punjab and Rajputana, and but three from Central India. Doubtless the species is much more common in some at least of these areas than the records indicate.

In Burma, *mauritii* is also widely distributed, and quite common especially in the dry season, but is restricted to the lowlands of the coastal districts and along the Irrawaddy, Sittang, Salween and Chindwin Rivers. Examination of the distribution of *mauritii* in India and Ceylon shows that a somewhat similar statement can be made for these areas also. All of the Indian and Ceylonese records are of localities

below the 500 foot level except the following :—Kapurthala and Lahore (750 feet), Gwalior (500-1,000), Banswara (1,000 or less), Salem (1,000), Joshachivir (1,200 or under), Jubbulpore and Dungapur (1,000-1,500), Hyderabad and Peradeniya (1,500-2,000), Dambulla (2,000), Bangalore (2,000-3,000), Kandlamadagu (2,500). (Elevations of Nemar Kheri and Katni in Central India are unknown.) The elevations just listed were determined from maps by Mr. Trueblood but the actual heights at which the worms were secured is usually unknown and may in some at least of the cases be lower than those mentioned. Twice only the actual elevations have been reported, 1,000 feet at Salem and 2,500 at Kandlamadagu. Accordingly in India and Ceylon as well as in Burma, and in particular in South India, *L. mauritii* appears to be a lowland species, quite unknown at present from elevations above 2,500 feet and but rarely found above the 500 foot level.

With one exception only all species of *Lampito* are, in accordance with Michaelsen's criterion—" Eine Art, die lediglich in einem eng begrenzten Gebiet vorkommt, ist als endemisch in demselben anzusehen."—endemic in South India. Presumably then *L. mauritii* is to be regarded as having also originated in South India somewhere in the vicinity of the region where its nearest relatives are today endemic. From this region it has migrated or been transported to other sections of India and other regions bordering the Indian Ocean.

The extra-Indian distribution is such that a large part of this distribution must be explained as a result of accidental carriage (either by man or animals or natural agencies) but how much of the Indian distribution is similarly to be explained is not yet clear. The wide distribution in Burma may indicate that the species is able to spread rapidly within a new region as a result of its own activities, once it has become established.

In view of the wide transference of several species of earthworms it scarcely seems likely that *mauritii* has been accidently carried only to tropical regions of the world. Hence it is necessary for the present to regard *mauritii* as a primarily tropical and lowland form that has been unable to adapt itself to non-tropical conditions or to penetrate into the higher hills in the tropical regions in which it is now established. (All of the localities, including Hong Kong, are south of the tropic of Cancer, except a very few in Bengal, United Provinces and the Punjab.)

Distribution.—Shasthancottah, Kerumaadi, Pallode, Trivandrum, Cape Comorin, Murukpuzha, Vazhote, Shertalay, in Travancore ; Trichur, Ernakulam, in Cochin ; Ramnad (Madura district), Pondicherry (South Arcot district), Madras, Ennur, Dowlaishweram and Agarru (Godaveri district), Kandlamadagu (Chittoor district), Salem, in the Madras Presidency ; Bangalore, in Mysore ; Hyderabad, in Hyderabad State, Deccan. Vareeg Island, in Portuguese India. Bombay, Salsette Island, Gujerat, Godhra, Broach, Surat, Ahmedabad, Nadiad, Dhanu, Sirvai Madhapur, Baroda, Palchar (=Palghar ?) and Joshachivir, in Bombay Presidency. Jubbulpore in the Central Provinces. Sur Lake, in Orissa. Nemar Kheri, Katni and Gwalior, in Central India. Dungapura and Banswara in South Rajputana. Benares in the United Provinces. Calcutta, Raniganj (Burdwan district), Bhogaon, Purneah,

Rajshahi, Saraghat, Betracona (Mymensingh district), and Siliguri, in Bengal. Lahore and Kapurthala in the Punjab.

Outside of India: Bentota, Vakvella, Peradeniya, Panadhure, Kanthalai, Dambulla, Trincomali, Jaffna, Belligame, Anuradhapura, and Colombo in Ceylon; the Maldive and Laccadive Islands including Minicoy; Mauritius, Seychelles, Comoro Islands, Madagascar, Zanzibar; lowlands of the coastal districts and along the Irrawaddy, Sittang, Salween, and Chindwin Rivers of Burma; Ross Island, Port Blair, Mt. Harriet, Jingighat, and Minnie Bay on the Andaman Islands; Siam (Bawti and Not Theinko in Peninsular Siam), Malay Peninsula (Singapore and Kuala Lumpur); Sumatra (Padang and Poeloe-Weh); Christmas Island, Nordwachter (Java Sea), Sumba (Kambera), Kisser Island (north of Timor) Labuan and British North Borneo, Philippine Islands (Manila), Nias; Kowloon, China, near Hongkong.

Michaelsen (1897, p. 208), erroneously included Naduvatam and Ootacamund in the distribution of *mauritii*, though the species is probably to be found at Naduvatam, a lowland locality. Beddard (1895, p. 384) included Labuan and the Seychelles in the distribution of the species, but no further evidence for this has been found. (Some of Beddard's papers are not available to the writer.)

Lampito palniensis (Stephenson).

1924. *Notoscolex palniensis*, Stephenson, *Rec. Ind. Mus.* XXVI, p. 333. (Type locality Marian Shola, Palni Hills, South India. Type in the Indian Museum.)

Material examined.—From the Indian Museum: 1 aclitellate (?) specimen labelled "*Notoscolex palniensis*, sp. nov. Under wood in jungle. Marian Shola *ca.* 7,000 ft. Palni Hills. 24 Aug. 1922. S. Kemp. W 1120/1".

External characteristics.—Unpigmented (? alcoholic preservation). The prostomium is retracted into the buccal cavity, apparently prolobous. The setae begin on ii on which segment all are present; on xxi *ab*<*bc*, but *bc*, *cd* and *aa* are about equal. Ventral setae of xviii apparently are lacking. Clitellar segments are distinguished from the neighbouring metameres only by the absence or indistinctness of the secondary annulation.

The spermathecal pores are minute and superficial, on or very close to *a*, at the anterior margins of viii and ix, just behind 7/8 and 8/9. The epidermis in the vicinity of the pores is wrinkled, the pores themselves rather difficult to find.

The female pores are probably paired, represented by minute, raised points on xiv, slightly anterior and just median to *a*, the actual apertures not seen.

The male pores are minute and superficial, about on *b*, at or near the anterior ends of a seminal (?) groove.

On xviii there is a sharply demarcated, transversely placed genital shield of elliptical outline, reaching antero-posteriorly to 17/18 and 18/19 and laterally to *c*. A central portion of this area is elevated, sloping gradually towards the posterior margin but just in front the slope is steep into a transverse depression. On the raised portion there is a

transversely placed, crescentic seminal (?) groove, with the concave side facing anteriorly, the ends of the groove about on *b*.

Internal anatomy.—Septa 5/6-12/13 are muscular to thickly muscular; 13/14-14/15 slightly muscular.

The gizzard is in v. The oesophagus is deeply constricted and very slender at the region of attachment of septa 8/9-14/15 and accordingly markedly moniliform. The calciferous ridges are high and lamelliform. What appears to be a characteristic oesophageal valve is present in the posterior part of xv and the anterior part of xvi, the intestine accordingly beginning in xvi. The typhlosole is a very low, slightly zigzagged ridge, practically unrecognizable posterior to lii.

The last pair of hearts is in xiii, the hearts of xii and xiii apparently latero-oesophageal. Parietal vessels are visible in xviii to xiii, in xiii probably passing to the ventral face of the gut. Extra-oesophageals probably as in *mauritii*, but distended with blood and readily recognizable only under the gizzard. In viii-xiv there is on each side a fairly large vertically placed mid segmental vessel on the wall of the oesophagus, passing into the supra-oesophageal trunk. No subneural. On the dorsal blood vessel and the anterior face of the septum in each intestinal segment there is a single, transversely placed, whitish ellipsoidal body, the so-called lymph gland.

On the anterior faces of septa 6/7-13/14, on each side and close to the oesophagus, is a vertically placed, flattened cluster of nephridial tubules, the size of the cluster gradually decreasing passing posteriorly. A large clump of nephridial tubules in v, on each side appears to be attached by a cord either to the gut just in front of the gizzard, or to the posterior face of 4/5 near the gut. In xiv and xv, on each side there is a small, rosette-like cluster of nephridial tubules. Transverse integumentary bands of nephridia are present in xvi and xvii. From xviii posteriorly the micronephridia are less obvious, as inconspicuous transverse rows at the bases of septa (posterior faces). Meganephridia are present from xxi (?) posteriorly.

The prostate at first glance appears to be like a *Pheretima* gland but when unfolded and straightened out is strap-shaped, the median margin thick and smooth, the lateral margin thin and incised. As in *Tonoscolex* which has similar glands the short and slender duct (*ca* 2 mm. long) emerges from the median margin of the gland almost at the anterior end.

The spermathecal diverticula are characterized by a slight spermatozoal iridescence. Diverticular junctions with the duct are slightly closer to the ectal than the ental end of duct but are certainly not at the ectal end of duct (even of the coelomic portion).

The male shield is an area of parietal thickening, the body wall in that region slightly raised into the coelomic cavity.

Remarks.—One prostate and duct, a portion of the intestine extending from xxvi to xxxviii, and a spermatheca had been removed in previous dissection, so that characterisation of the anterior portion of the typhlosole is impossible. As the specimen is unique the removal of further structures is undesirable, although this prevents adequate description of the spermatheca.

Calciferous lamellae appear to be more highly developed in this species than in the perichaetine forms and should be more accurately described than it now possible.

Diagnosis.—Quadrithecal, spermathecal pores, on or close to *a*, on the anterior margins of viii and ix, just behind the intersegmental furrows. Male pores about on *b*, at ends of a transversely placed, crescentic seminal (?) groove with the concave face anteriorly, on a transversely placed genital shield that reaches to *c* and anteroposteriorly to 17/18 and 18/19. Clitellum ? First dorsal pore on 10/11. Setae lumbricine ; on xxi, *ab*<*cd*, *bc*, *cd* and *aa* about equal. Pigmentation ? Length 120 mm. Diameter 3 mm.

Intestine begins in xvi. Typhlosole a very low, slightly zigzagged ridge ; beginning in (?) and terminating in lii (?). An unpaired lymph gland on the dorsal blood vessel posteriorly in each intestinal segment. Holandric ; seminal vesicles in xi and xii.

Distribution.—Known only from the type locality, Marian Shola, Palni Hills, South India.

Lampito sylvicola Michaelsen.

1907. *Lampito sylvicola* Michaelsen, *Mitt. Mus. Hamburg.* XXIV, p. 161. (Type locality Tiger Shola, near Kodaikanal, Palni Hills, S. I. Type in the Indian Museum.)
1909. *Lampito sylvicola*, Michaelsen, *Mem. Ind. Mus.* I, p. 181.
1923. *Megascolex sylvicola*, Stephenson, *Oligochaeta* in *F. B. I.* S. p. 273.

Material examined.—From the Indian Museum : 1 aclitellate specimen labelled, " *Lampito sylvicola* Michlsn. Tiger Shola, near Kodaikanal, S. I. Dr. J. R. Henderson. Type. ZEV 2941/7 ".

External characteristics.—Unpigmented (? alcoholic preservation). The prostomium appears to be prolobous, possibly proepilobous, as there are two, very short, longitudinally placed furrows close to the mid-dorsal line on the anterior portion of i. Clitellum unrecognizable. The setae begin on ii ; 7/ii, 11/iii, 14/iv, 14+/viii, 16+/xii, 28+/xx, *ca.* 28/xxx, gaps in the setal circles where setae would be expected apparently have no setal follicles, at least follicular apertures are unrecognizable.

The spermathecal pores have not been seen but are obviously minute and superficial, probably located on viii and ix, on *a*, about half way between the transverse setal lines and the posterior intersegmental furrows.

The female pores have not been identified definitely but are probably represented by protuberant spots just anterior and median to *a* on each side of xiv.

The sites of the male pores are probably indicated by very minute spots with marginal areas that are whitish and slightly iridescent, each pore located on a tiny, transversely placed area of oval outline in *ab* with the pointed end mesially, the pore towards the lateral margin on a slight protuberance, the median portion depressed and with a greyish translucent appearance. The dumb-bell shaped wall which, according to Michaelsen, surrounds the porophores, is only very slightly raised,

faintly demarcated and scarcely recognizable. Ventral setae of xviii are lacking, or invisible.

The presetal portion of xix is extended, as a result of the development of the genital marking and is more than twice as long as the postsetal portion. The transversely placed marking is presetal, extending laterally into *bc*, and anteriorly nearly to 18/19, a central area of greyish translucence slightly depressed, with a narrow, clearly demarcated opaque rim slightly raised, seta *a* and possibly also *b* included in the posterior margin.

Internal anatomy.—The typhlosole is a very low, simple, straight ridge.

In xiv-xvii on each side there is a parietal vessel as in *mauritii*. These vessels are invisible in xiii where they presumably pass to the gut wall. No subneural.

On the anterior face of a fragment of 12/13 there is a vertically placed, flattened cluster of nephridial tubules. On the posterior face of a right fragment of 13/14, close to the parietes, is a small rosette-like cluster of tubules. On left side, just lateral to the oviducal funnel a similar cluster, on anterior face of 13/14. There are broad, transverse bands of integumentary micronephridia in xv-xvii as in *mauritii*. From xviii posteriorly inconspicuous vertical rows at the bases of septa (posterior faces). Meganephridia present from xx posteriorly, on the ventral parietes behind the micronephridia but well in front of the posterior septa.

The vas deferens passes into the extreme ental end of the prostatic duct. The latter is slender, looped, about 2 mm. long.

The anterior spermatheca of the right side passes into the parietes just in front of a fragment of septum 8/9 while the other spermatheca of the same side passes into the parietes behind the setae of ix. The spermathecal diverticula are characterized by a slight iridescence.

The longitudinal musculature is uninterrupted over the site of the genital markings.

Remarks.—Most of the internal organs had been removed from the anterior end so that it is impossible to report on certain important structures. The iridescence of the spermathecal diverticula as well as of the male funnels probably indicates that the specimen was at least postsexual if not actually sexual, though Michaelsen considered the worm to be " half mature "

Diagnosis.—Quadrithecal, spermathecal pores on or close to *a*, postsetal on viii and ix, half way between the transverse setal lines and the intersegmental furrows. Male pores on slight protuberances from lateral portions of transversely placed porophores of oval outline in *ab*. Genital marking presetal, on xix, in *cc*. Clitellum ? First dorsal pore on 9/10. Setae perichaetine : 8/ii, 11/iii, 14/iv, 16/xii, 26/xx. Unpigmented ? Length 185 mm. Diameter $3\frac{1}{2}$ mm.

Intestine begins in xvi ? Typhlosole, a very low, simple, straight ridge ; beginning in (?) and terminating in (?). Metandric ; seminal vesicles in xii.

Distribution.—Known only from the type locality, Tiger Shola, Palni Hills, South India.

Lampito vilpattiensis Michaelsen.

1907. *Lampito vilpattiensis*, Michaelsen, *Mitt. Mus. Hamburg* XXIV, p. 160 (Type locality Vilpatti, Palni Hills, S. I. Types in the Indian Museum.)
1909. *Lampito vilpattiensis*, Michaelsen, *Mem. Ind. Mus.* I, p. 179.
1916. *Megascolex vilpattiensis*, Michaelsen, *Mjöberg's Austral. Exp.* p. 52.
1923. *Megascolex vilpattiensis*, Stephenson, *Oligochaeta* in *F. B. I.* S., p. 285.

Material examined.—From the Indian Museum : 13 aclitellate and 2 clitellate specimens labelled, " *Lampito vilpattiensis* Michlsn. Vilpatti, Palni Hills, S. I. Dr. J. R. Henderson. Types. ZEV 2934/1 ".

External characteristics.—The prostomium is retracted and appears to be prolobous, but two slight furrows near the mid-dorsal line at the anterior margin of i are recognizable. There is usually a pore-like but possibly imperforate marking on the mid-dorsal line at 9/10.

The setae are lumbricine on ii-viii, occasionally an extra seta or two present on one or more of segments iv-viii. The following numbers were noted : 8/ii, 8/iii, 8/iv, 8/viii, 12/xii, 22/xx ; 8/ii, 8/iii, 8/iv, 10/viii, 13/xii, 22/xx, 24/xxx ; 8/ii, 8/iii, 8/iv, 8/viii, 12/xii, 20/xx ; 8/ii, 8/iii, 8/iv, 8/viii, 10/xii, 20/xx. Ventral setae apparently are lacking on xviii.

The clitellum is protuberant, and extends from a posterior portion of xiii to or just behind the setae of xviii : intersegmental furrows lacking, setae present, dorsal pores present (clitellum not fully developed ? certainly not as protuberant as on other specimens) or represented by non-functional markings at 13/14 and 15/16-17/18.

The spermathecal pores are minute and superficial, two pairs, on the anterior secondary annuli of viii and ix, on *a* (14), the pores usually about equidistant from the anterior intersegmental furrow and the presetal secondary furrow (location confirmed by dissecting spermathecal ducts out of the parietes). The actual aperture identifiable only with high magnification and brilliant illumination, though the sites of the pores can usually be recognized as minute point-like elevations with lower magnification. On 7/8 and 8/9 and on *a* on each side there is a much more obvious, greyish translucent spot that looks as if it might contain a pore though no perforation has been recognized (several specimens). These are the markings which Michaelsen mistook for the spermathecal apertures.

The female pores are paired, anterior and very slightly median to *a* (2 clitellate and several aclitellate specimens).

The male pores are minute and superficial, in *ab*, each pore at or near the centre of a tiny, transversely placed porophore of elliptical outline reaching from *a* to *b*. Occasionally these porophores are sharply demarcated, with a greyish translucent central portion and a narrow, opaque rim, usually displaced posteriorly so that they are nearer to 18/19 than 17/18 but still about in line with or perhaps very slightly posterior to the transverse setal line.

The genital markings are one pair of fairly clearly demarcated areas on the presetal portion of xviii which is elongated. On the clitellate specimens 17/18 is not of course visible but on those clitellate specimens on which 17/18 is recognizable ventrally the furrow is dislocated anteriorly by the markings. The latter are of shortly elliptical outline, usually

slightly diagonal so that the posterior end is slightly nearer the mid-ventral line, with a central portion which may be greyish and translucent protuberant in a regularly convex fashion and clearly marked off from a very narrow, opaque rim that is not or only very slightly protuberant. On 4 specimens the rims are in contact midventrally but not united while on 10 specimens the markings are separated by a midventral strip of unmodified epidermis. On one specimen the markings are practically longitudinal and almost confined to *ab*, but on other worms the markings extend into *bc*.

Internal anatomy.—Septum 5/6 is membranous, transparent but slightly strengthened by a few muscle fibres.

The gizzard is in v (3). On the inner wall of the oesophagus there is on each side a series of longitudinal ridges lacking only at the mid-ventral and mid-dorsal regions. In x-xiii these ridges are especially protuberant and large enough relative to the size of the oesophagus in this worm to be termed lamellae. The arrangement of the lamellae is much the same as in *mauritii* except that here the ridges are interrupted (or very markedly decreased in height) midsegmentally rather than at the region of septal attachments so that there appears to be a deep vertical cleft or slit on each side of the oesophagus midsegmentally. In one worm tiny calcareous particles are visible between the lamellae. The intestine begins in xvi (2) with an oesophageal valve in the posterior portion of xv and the anterior part of xvi. The typhlosole begins rather gradually in xxv-xxvi but is at most only a very low, simple ridge, straight or very slightly zigzagged.

The last pair of hearts is in xiii (3). No subneural vessel and no lymph glands.

In v on each side and in the dorsal portion of the segment there is a rather spheroidal mass of nephridial tubules attached to the gut by a fairly strong cord. In vi-x at least there is a pair of smaller nephridial masses flattened in a vertical fashion against the anterior faces of the septa at the sides of the oesophagus, the size of the clusters gradually decreasing posteriorly. In vi-viii a rather translucent cord passes downwards on the septum from each cluster to the parietes and then anteriorly to the septum next in front. These cords which may be ducts of the nephridial clusters could not be traced, in the specimens studied, further than the anterior septum. Clusters of nephridia are probably present on the anterior faces of the septa in xi-xiii, the attachment to the septum becoming more ventral passing posteriorly. In xiv there appears to be a transversely placed row of integumentary micronephridia on each side, on the ventral parietes just in front of 14/15. From xv posteriorly there is a transversely placed band of integumentary micronephridia on the ventral parietes on each side, just behind the septum.

The prostates are shortly strap-shaped with thickened median margin and more or less deeply incised lateral margins, the duct arising from the median margin anteriorly. The duct is about 3 mm. long, looped, the ectal two-thirds with a strongly marked muscular sheen, the ental third with no sheen. The *vas deferens* passes into the ental end of the duct at the margin of the gland but cannot be traced anterior to the point at which it rises from the parietes in xviii.

The spermathecal duct is about twice as long and half as thick as the ampulla and is abruptly narrowed in the parietes. The duct lumen is abruptly narrowed in the region of the diverticular junctions and very small ectally. Each diverticulum has a seminal chamber and a stalk of about equal length, the lumen of the stalk very narrow. The diverticular junction is just ental to the parietes.

The longitudinal musculature is uninterrupted over the sites of the genital markings.

Diagnosis.—Quadrithecal, spermathecal pores on *a*, on the anterior secondary annuli of viii and ix, about half way between the intersegmental furrow and the presetal secondary furrow. Male pores at or near the centres of transversely placed porophores of elliptical outline in *ab*. Genital markings paired, presetal on xviii, reaching laterally into *bc* and into contact or almost so midventrally, slightly diagonal, the posterior ends nearer the midventral line. Clitellum from posterior portion of xiii to setae of xviii. First dorsal pore on 10/11. Setaeo perichaetine : 8/ii-iv, 8-10/viii, 10-13/xii, 20-22/xx. Unpigmented. Length 70-90 mm. Diameter 2-2½ mm.

Intestine begins in xvi. Typhlosole a very low, simple ridge, at most only slightly zigzagged ; beginning in xxv-xxvi, terminating in (?). Metandric ; seminal vesicles in xii.

Distribution.—Known only from the type locality, Vilpatti, Palni Hills, South India.

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V *NELLOCASTER*, GEN. NOV., WITH A NOTE ON INDIAN SPECIES OF *WOODWARDIELLA*.

Woodwardiella bahli Stephenson 1925 was assigned to the genus *Woodwardiella*, by definition meganephridial, in the belief that the anterior tufts are to be regarded as meganephridia rather than micronephridia, and also on a supposition that integumentary micronephridia

are lacking in the posterior portion of the body. But Bahl (1926) maintains that the clusters of integumentary tubules which Stephenson regarded as modified meganephridia are actually bunches of discrete micronephridia, each nephridium with its own duct and external aperture, and further that there are integumentary micronephridia along with the enteronephric meganephridia in the postclitellar segments of the body.

Since *Woodwardiella* is by definition "purely meganephridial", *W. bahli* must be transferred to some other genus. Transfer to *Notoscolex* would only serve to emphasize further the polyphyletic nature of that genus. Inclusion in *Lampito* which has a somewhat similar excretory system would be possible only by a repetition of the same sort of mistake that has produced the present polyphyletic Megascolecin genera. The only alternative therefore is erection of a new genus.

Nellogaster, gen. nov.

Diagnosis.—Bithecal (or quadrithecal), spermathecal pores on (7/8-8/9 or) 8/9, on or lateral to *b*. Female pores paired, on xiv, in *aa*. Male pores on xviii, on or lateral to *b*. Genital markings (when present) postclitellar. Setae lumbricine. Clitellum annular, on xiv-xvii. First dorsal pore on 9/10 (-10/11). Unpigmented.

All septa from 5/6 present. Gizzard in vi. (Calciferous tissue in more or less lamelliform ridges in x-xiii.) Intestine begins in (xvii-) xviii. Last hearts in xiii. Excretory organs; one pair of clusters of closed enteronephric (pharyngeal) micronephridia in iv[1]; one pair of clusters of discrete, closed, exonephric, integumentary micronephridia per segment from v posteriorly; one pair of open, enteronephric meganephridia with preseptal funnels from xxv posteriorly. Holandric (or metandric); seminal vesicles in xi and xii (or xii only). Prostates strap-shaped. Spermathecae with unpaired diverticula, at ental ends of spermathecal ducts. Ventral setae of xviii modified to penial setae.

Genotype.—*Woodwardiella bahli* Stephenson 1925.

Remarks.—Inasmuch as only one species, and that not too well known can now be definitely included in *Nellogaster*, the diagnosis must be provisional and subject to modification as further species are studied.

Several species now included in *Notoscolex* and *Woodwardiella* may have to be transferred to *Nellogaster* when more accurate or detailed information is available, especially with regard to the excretory organs. Inclusion of these species will require, except for the excretory organs, only slight modifications in the generic definition (already indicated in the definition above in the parentheses).

The nephridia of *Notoscolex gravelyi* Stephenson 1916 appear to be similar to those of *bahli*. The excretory system of *Woodwardiella hastata* (Stephenson) 1915 apparently differs from that of *bahli* only in the attachment to the parietes, at least anteriorly, of each cluster of tubules by a stalk, supposedly a common duct of all tubules in the cluster but possibly a group of separate ducts. Nothing is known of the nephridial system

[1] On pp. 115 and 120 (Bahl, 1926) and in figure 1 on p. 116, the pharyngeal nephridia are said or shown to be in iv, while on page 121 they are said to be in v. Presumably this latter statement is to be regarded as a misprint.

of *Notoscolex termiticola* Michaelsen 1910 except that it was described as micronephridial, but this species is similar in a number of respects to *bahli*. If the inclusion of all of these species in *Nellogaster* is possible the genus occupies a rather small area which includes a portion of Ceylon and a neighbouring part of south India : Colombo (*bahli*), Peradeniya (*termiticola*), Kandy (*gravelyi*), and Parambikulam, Cochin, South India (*hastata*). Each species has been found but once. All species are lowland (*bahli*, sea level) or from lower elevations in the hills : Peradeniya—1,500 feet, Kandy—1,600 feet, Parambikulam—1,700 to 3,200 feet.

Nellogaster is distinguished from *Lampito* by the presence of only one pair of clusters of pharyngeal micronephridia, presence of integumentary micronephridia in clusters in v-xiii, location of the gizzard in vi, more posterior location of the first intestinal segment, and the unpaired spermathecal diverticula.

Nellogaster bahli (Stephenson).

1925. *Woodwardiella bahli*, Stephenson, *Proc. Zool. Soc. London*, 1925, p. 888. (Type locality Colombo, Ceylon. Types in the British Museum.)
1926. *Woodwardia bahli*, Bahl, *Quart. J. Mic. Sci.* LXX, p. 114. (Nephridia.)

Material examined.—None (available).

Diagnosis.—Bithecal, spermathecal pores on 8/9, on *c*. Male pores at or near centres of longitudinally placed, widely paired porophores of elliptical outline that extend nearly to 17/18 and 18/19. Genital markings paired ; circular markings on 17/18 with centres about on *a* ; a diagonally placed marking with a central, slit-like depression on xviii between each circular marking and the male porophore. Setae : $ab<$ *cd*, $dd<\frac{1}{2}$C posteriorly. Length 96-98 mm. Diameter 2 mm.

Intestine begins in xviii. Typhlosole ? Holandric ; seminal vesicles in xi-xii. Penial setae 1·55-1·8 mm. long, thickness 0·01 near tip, 0·011 at middle, 0·012 near base ; shaft slightly bowed, ectal portion hooked in opposite direction from main curvature, unornamented.

Distribution.—Known only from the type locality, Colombo.

NOTE ON INDIAN SPECIES OF *WOODWARDIELLA*.

With the transfer of *W. bahli* to a new genus there remain for further consideration in our region (India, Burma and Ceylon) six species of *Woodwardiella ; burkilli* (Michaelsen) 1907, *hastata* (Stephenson) 1915, *sarasinorum* (Michaelsen) 1897, *uzeli* (Michaelsen) 1903, *kayankulamensis* Aiyer 1929, and *pumila* Stephenson 1931. Of these, *burkilli* is not a *Woodwardiella* and must be the type of a new genus closely related to *Tonoscolex ;* while *hastata* possibly should go into *Nellogaster*. *W sarasinorum* as defined by Stephenson in 1923, has " Micronephridia aggregated on each side of the middle line into compact tufts, attached to the body wall in line with *c*." and obviously should not be left in a " purely meganephridial " genus. In absence of meganephridia of one sort or another, transfer to *Notoscolex* is suggested. Should enteronephric meganephridia of the *Nellogaster* type be present in a posterior portion of the body, relationships to the *Nellogaster* species must be

considered. This leaves three species, one each in Burma (*pumila*), Ceylon (*uzeli*) and India (*kayankulamensis*). All three are much alike, possibly even specifically identical, and further are closely related to certain Australian species of *Woodwardiella*. Worms of the small size of these three species are easily and often transported. Possibly all three may eventually prove to be importations into the regions from which they are now only known.

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MGIPC—M—III-8-17—19-12-38—400.